Space Data's Proposed ATG Rules

Proceeding 03-103

Presented to FCC
Wireless Telecommunications Bureau
and
Office of Engineering and Technology

June 10, 2004

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Outline

- Space Data Summary
- Air To Ground (ATG)
  - Currently ATG does not allow customer choice
  - Verizon, AirCell, and Boeing proposals maintain lack of consumer choice
  - Competitive solution uses stratospheric platforms to link customers without airlines playing gatekeeper
  - Integrating the ATG with CMRS technologies / spectrum improves service and convenience while reducing prices
  - Rural uncovered markets can be helped also
  - Auction Credits
  - Interference analysis

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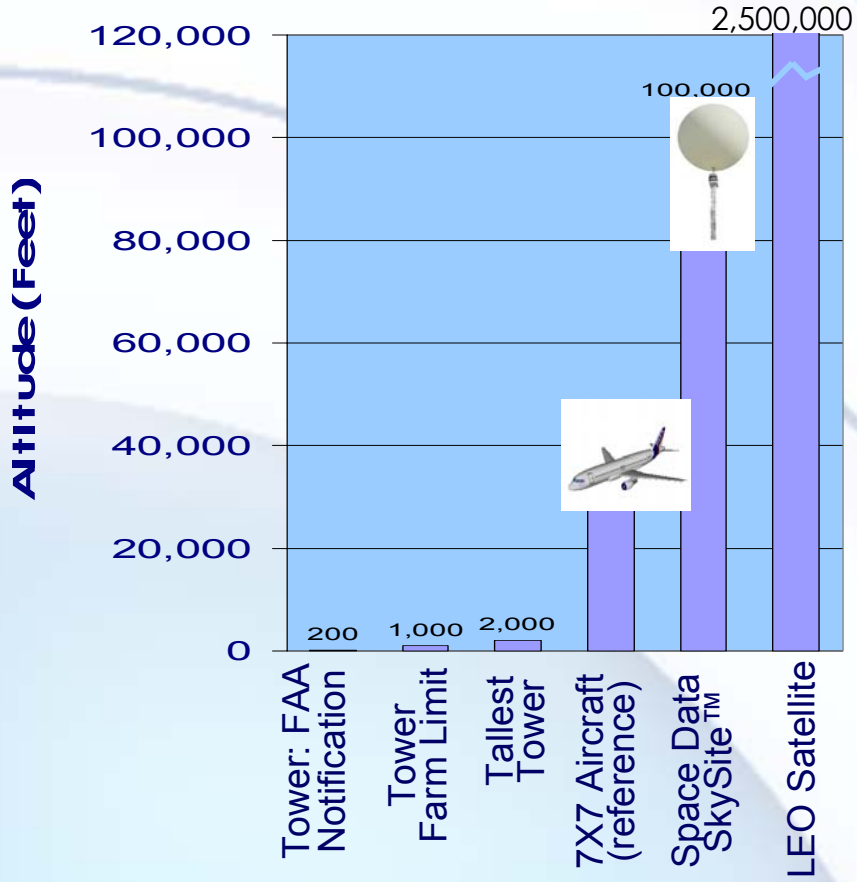
SkySite® Platform: A 20-mile-high 'Tower' Providing Rural Coverage

One SkySite™ = 250 Towers & users keep same device



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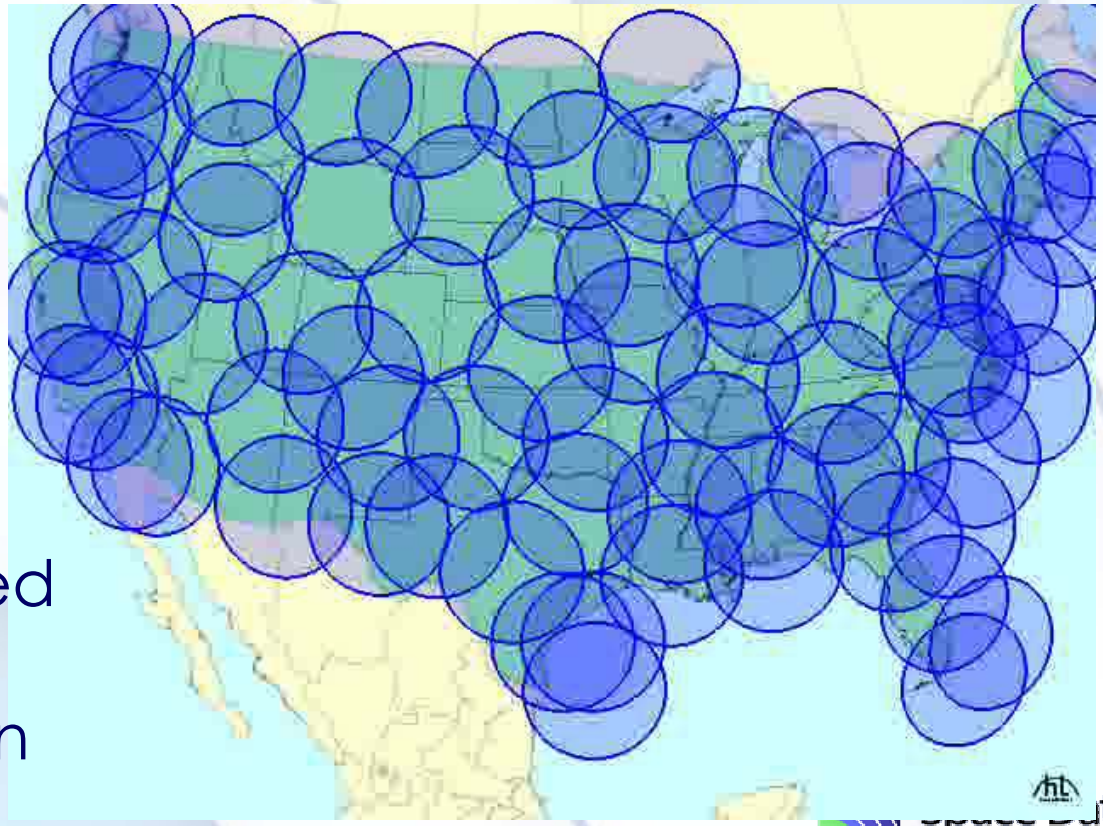
Space Data's Coverage Solution

Wireless repeaters on weather balloons at 100,000 ft provide complementary coverage to towers

- Uses inexpensive user devices
- Roaming onto towers for urban coverage
- Environmentally Benign & Safe
- FCC/FAA approved
- Leverages 60+ yrs of weather balloon operations



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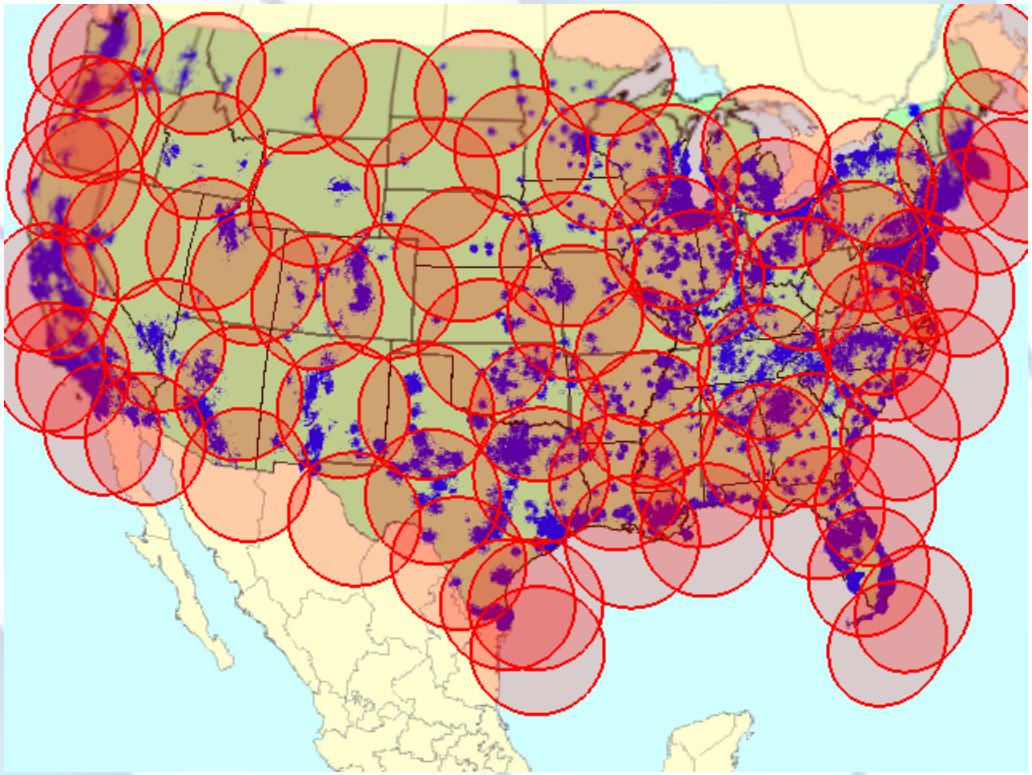

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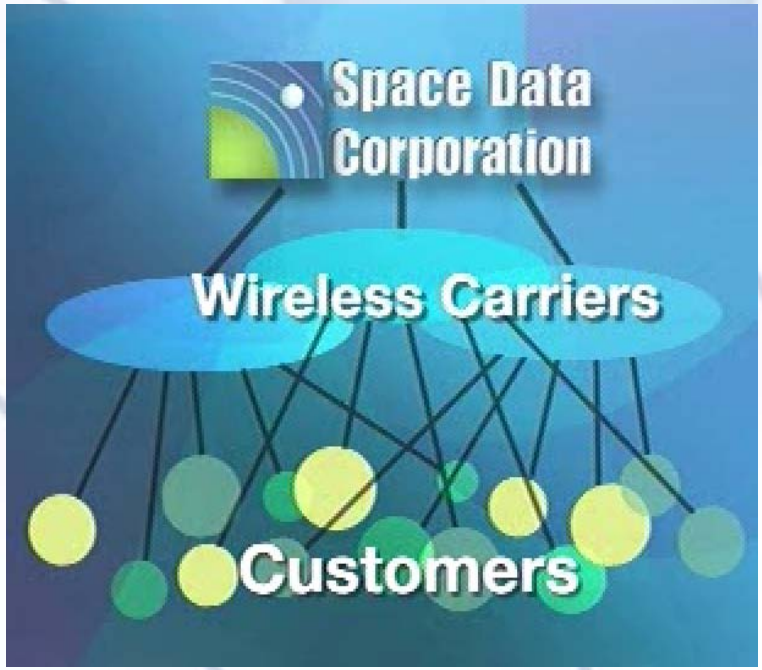
Carriers' Carrier Business Model

Space Data does not market to end users
We sell to carriers who in turn market to end users

Wireless Carrier Provides:

- Existing sales channels
- Existing brands
- Existing handheld devices
- Existing pricing plans
- Existing customer service
- Existing billing



Space Data fills all the coverage gaps

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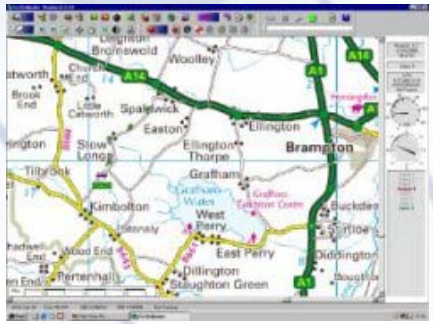
Initial System Applications

- Telemetry
  - Oil wells & pipelines
  - Irrigation control
  - Remote security
- Telematics
  - Road side assistanc
  - Air bag notification
- Location services
  - Asset tracking
  - GPS Vehicle Location





- 2-way wireless email
  - Text messaging
  - Enterprise applications

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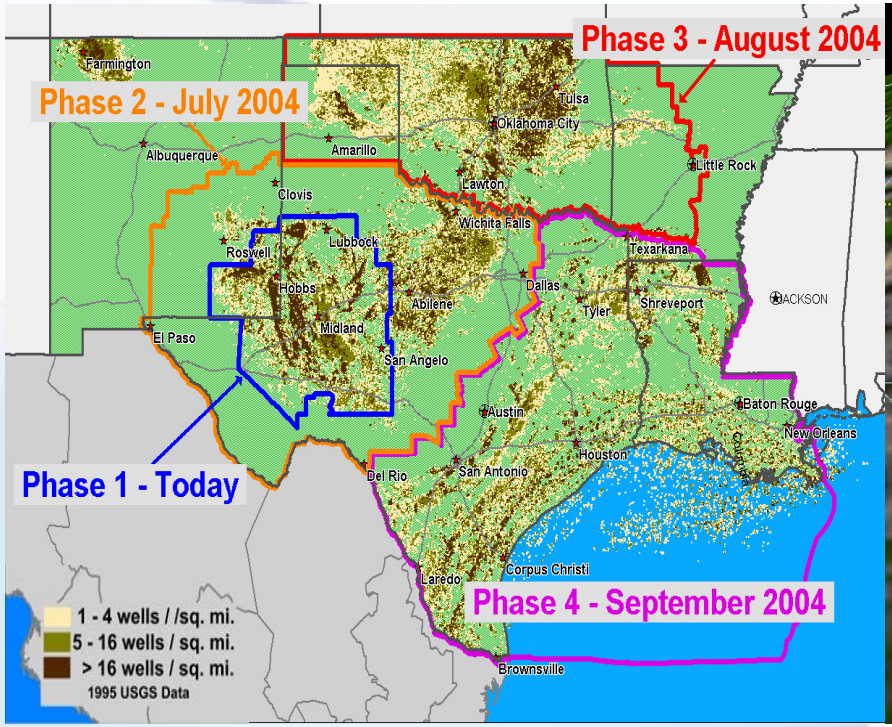
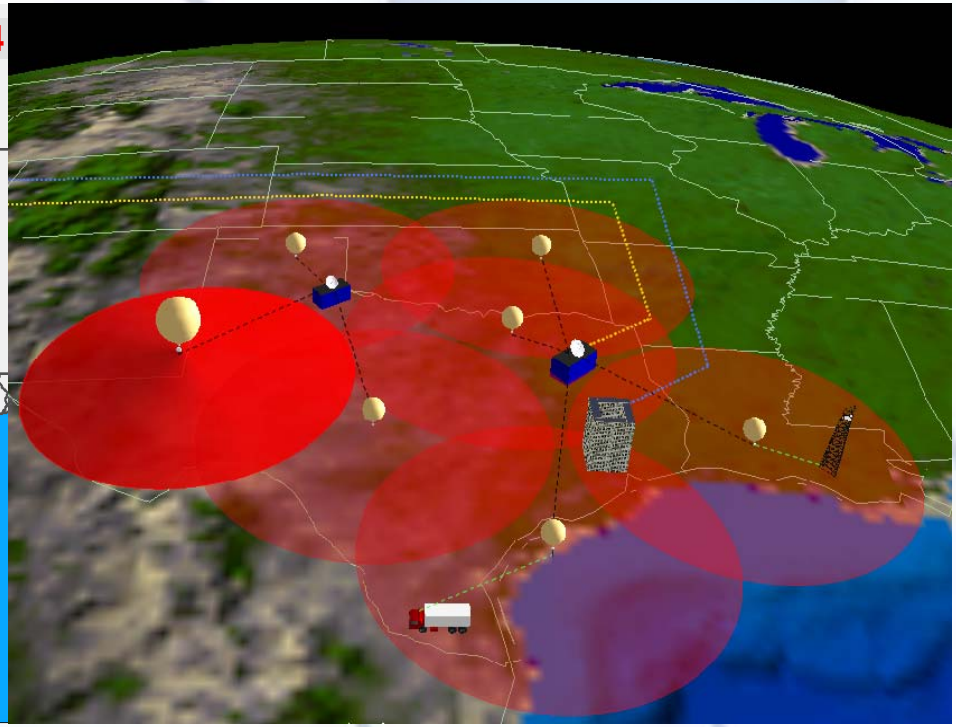
Initial M2M/Messaging Coverage

- Initial Region: 7 sites Nationwide: 70 sites
- First region is oil and gas areas losing CDPD in 2004
- Targeting enterprises with well monitoring, asset tracking, and field personnel communication needs





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ATG Today: No Consumer Choice Equals Poor Service & High Prices

Metric	CMRS	ATG
Competition	95% pops have > 3 choices	One provider = No Choice
Availability	3 technologies for > 87% pops	< 30% of plane are equipped
Price / Min.	$0.11 / min. avg.	$3.99 / minute
Traffic	35 calls / flight equivalent	1.5 calls / flight
Technology	Multiple, improving broadband tech.	one narrowband

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ATG through Cabin-Mounted Equipment = No Consumer Choice

- No airline will install multiple ATG systems on one plane due to weight constraints
- Cabin-mounted ATG makes airline a gatekeeper:
  - Anti-competitive: no customer choice
  - Cannot integrate with consumer's CMRS account
  - Easily disabled by terrorists to control information flow

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Stratospheric Platforms provide a Competitive Approach to ATG

- Stratospheric Platforms are 2-3 times higher than commercial planes and are a new technology that can be leveraged to help solve ATG issues
- No cabin-mounted equipment needed
- Direct user link from a consumer's handset to facilities outside of the airplane allows true choice and tie-in with a consumer's terrestrial service
- Will require new handsets that span both the cellular and the ATG band

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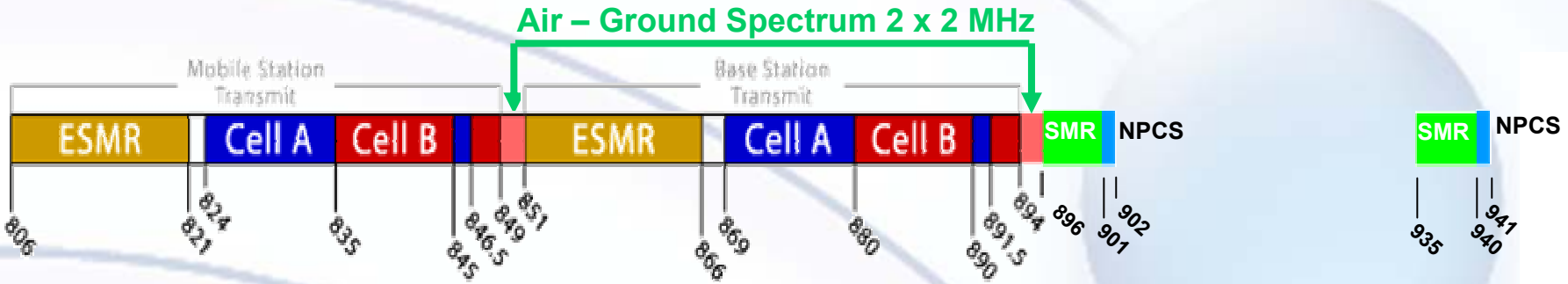
Leverage ATG's Proximity to Cellular



- ATG adjacent to top end of B' cellular block
- Very little cost to expand Rx / Tx capability of cellular handsets from 25 MHz to 27 MHz (8% more)
  - Requires ATG base station to transmit at 894-896 MHz, opposite current implementation of ATG
  - Interference from radars is addressed later
  - Handset receiver / GPS would sense Doppler shift and/or altitude to switch to ATG band

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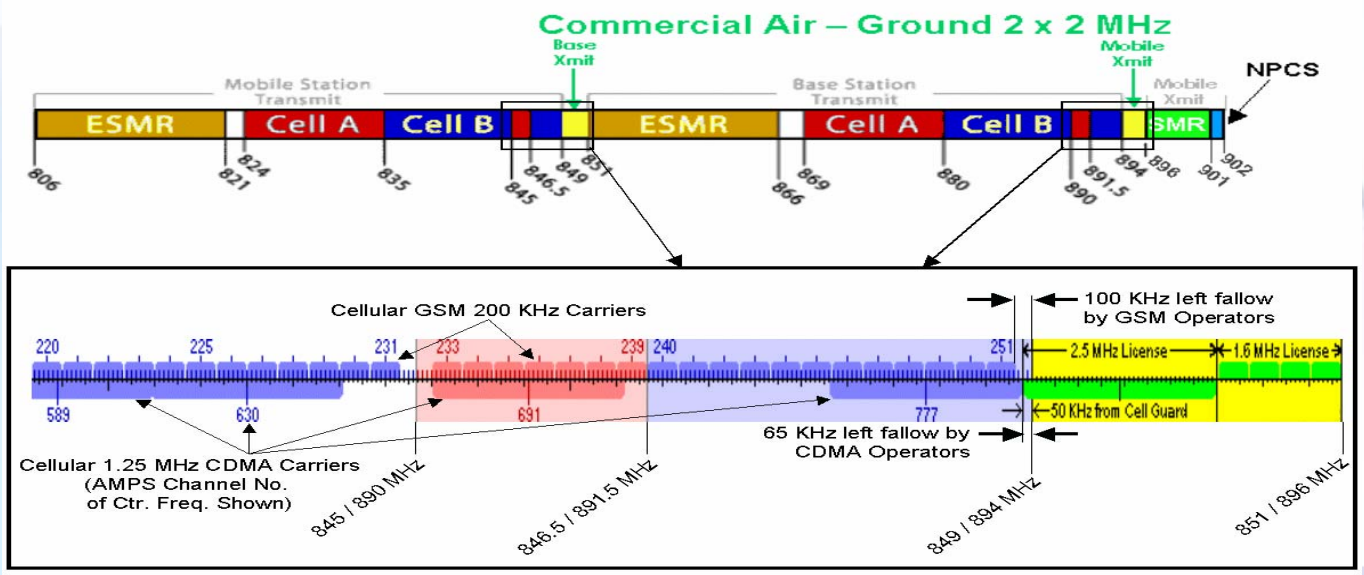
Proposed ATG Channels

- Add 50 kHz of cellular block B' to ATG to create:
  1) 1.25 MHz paired license for CDMA2000 tech.
  2) 0.8 MHz paired license for GSM technologies
  - Uses fallow 65 kHz of cellular block B' left as a guardband by GSM and CDMA operators
  - Potential for up to a 1.2 MHz paired license
- Alternatively, use ATG alone to create a 1.25 MHz paired and a 600 kHz paired license
- Allows for service to both GSM & CDMA users



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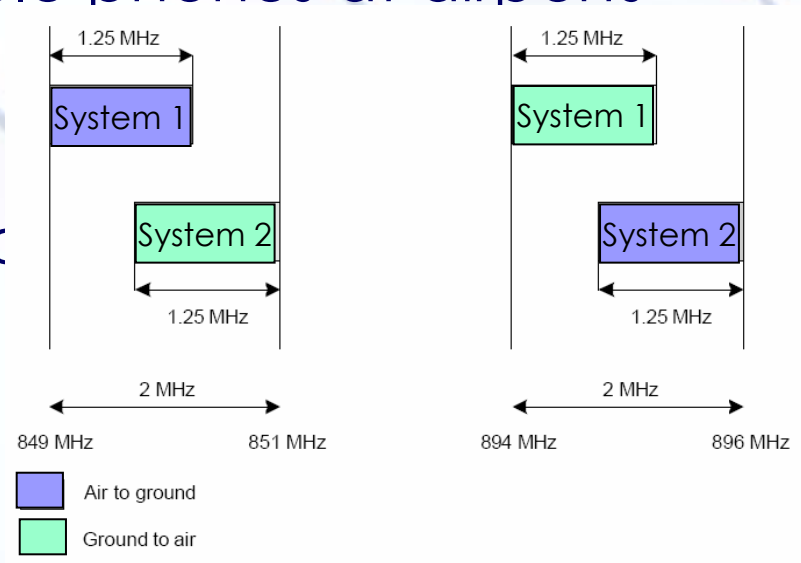
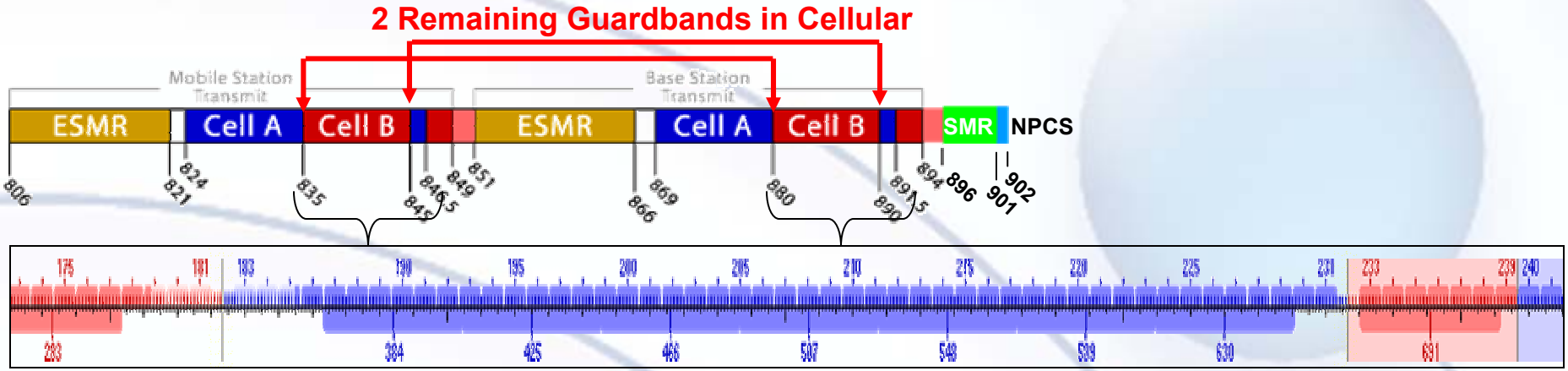
AirCell Approach is Viable Alternative

- CDMA compatible spectrum for two operators
  - If one licensee used cabin-mounted equipment and one used facilities outside the aircraft then CDMA customers have choice
- Provides no path for GSM consumers other than buying a second phone
  - Potential to sell disposable phones at airports
- Other approaches
  - Verizon: no competition
  - Boeing: aircraft mounted smart antenna = Three licensees, but still no consumer choice



Use for Customers outside Cellular Coverage using Fallow Guardbands



- Allowing terrestrial use for handsets unable to detect a cellular signal provides service in unserved areas
- Allocating two remaining 200 kHz guardbands to ATG expands second ATG license to 1.2 MHz paired
- Stratospheric platforms > 20 mi. from nearest receiver eliminating near-far problem & need for guardbands
- Cellular licensees give up fallow spectrum, but gain access through roaming agreements to ATG market

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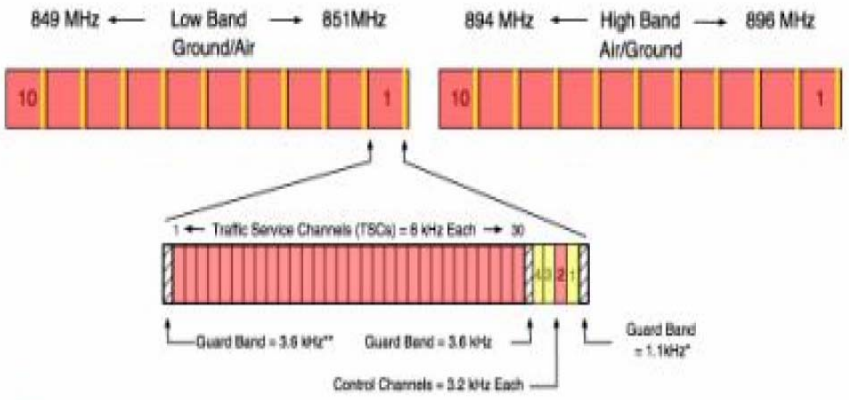
Auction Rebanded ATG and provide Bidding Credits for ATG Incumbents

- ATG allocation allowed 6 providers on 4 MHz
  - One paired 3.2 kHz control & sharing of 29 paired 6 kHz traffic channels in any given area per licensee
  - Paired spectrum / licensee = 3.2+29/6*6=32.2 kHz
- Proposals by Boeing, Verizon & Aircell would increase total bandwidth per licensee from 0.0644 to 2.5 MHz
- Allocating an incumbent 38 times more spectrum and opening up new uses beyond the current ATG license capability requires an auction of all ATG spectrum
- ATG incumbents should get a bidding credit equal to ratio of 64.4 kHz divided by the auctioned bandwidth
  - For example 2.5 MHz license = 2.6% credit



Interference with Aircraft Electronics

- Handset interference with Aircraft Electronics is purview of FAA/Airlines
  - Already being addressed by the RTCA process
    - Redundant to address it in this NPRM
  - FCC regulations should permit handset use if FAA/Airlines permit use as a result of RTCA
- RF emissions occur on thousands of flights everyday without aircraft interference
  - >50% of passengers carry cell phones, several on each flight are in carry-ons with power on
    - Active power control turns up transmit power up to register on base stations during flight
  - Airplane navigation issues not being reported

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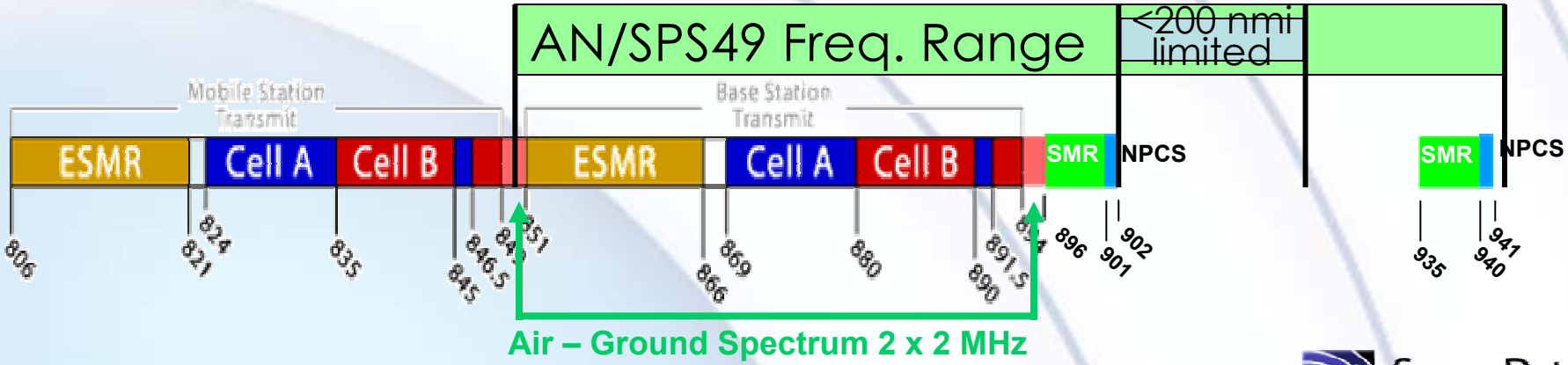
Responses to Verizon 6-3-04 Filing

"Space Data proposal to reverse the ground-to-air and air-to-ground bands is untenable for this would expose receivers in aircraft to radar interference ..."

Response: Also an issue for Verizon's proposal. Agreements limit radar operation to 902-928 band when within 200 nmi. of coast

- AN/SPS49 radars operate at 850 – 942 MHz, so non-compliant operation also can cause interference to Verizon's proposed 849-851 aircraft receivers
- If operation outside of agreements cause interference then enforce the agreement instead of letting non-compliant operate cause inefficient spectrum allocations



Source: DA 98-2394, WTB Announces Revised Pre-Auction Deadlines for the Auction of 528 LMS Licenses, page 3-6.

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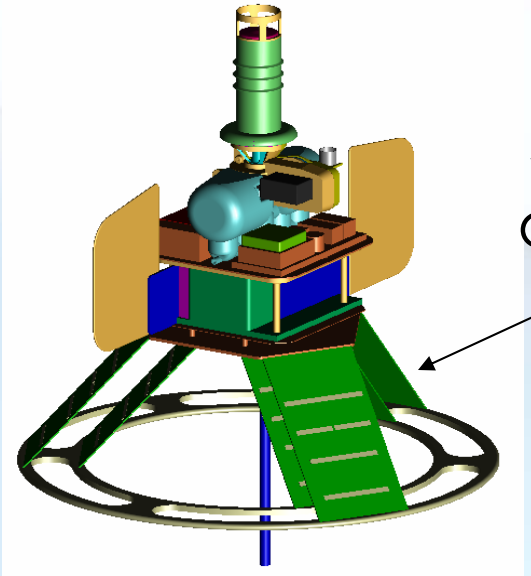
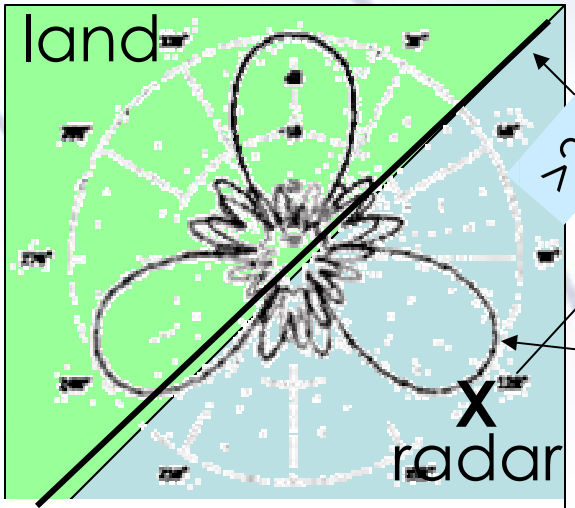
Responses to Verizon 6-3-04 Filing

"Stratospheric platforms" would be susceptible to receiving radar interference potentially more debilitating than that now occasionally encountered by current ground stations at low antenna elevations"

Response: Not an issue. Sector of stratospheric platform antenna oriented out to sea can be turned off and is not needed for coverage within continental US.



3-beam antenna



Expected beam pattern

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Responses to Verizon 6-3-04 Filing

"The proposal to implement handsets that would operate aboard aircraft in the ATG bands as expanded into the cellular and/or SMR bands is fraught with problems. Not only would such handsets be more expensive, their use would require a major change in airline, FAA, and FCC policies."

Response: Handsets modification are inexpensive.

- Expanding a modern handset's receive and transmit ranges by 8% would not be expensive
  - BPCS handsets have transmit and receive frequency ranges of 60 MHz, 140% more range then a cellular handset, yet cost roughly the same as a cellular handset
- Changes in airline & FAA policies are required, but the RTCA process is the place to examine these issues, not here.
- FCC policy changes are needed if ATG spectrum is to be used efficiently. Purpose of NPRM is to explore this.

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Responses to Verizon 6-3-04 Filing

"The reallocation of spectrum for the Space Data scheme is beyond the scope of the current notice of proposed rule making, and would embroil the Commission in a protracted proceeding against existing terrestrial licensees. Such a move would set back by years the opportunity to implement rules that would facilitate terrestrial broadband based ATG service in competition with the existing and proposed satellite ATG service"

Response In this ex parte, Space Data has offered a scheme that is fully within the ATG allocation: one 1.25 MHz paired license and one 600 kHz paired license or agrees with Aircell's approach. However, these alternatives are less optimal.

- The rapidly developing Stratospheric Platform technologies offer the ability to use otherwise fallow spectrum in terrestrial licenses to provide better service to air travelers and unserved rural areas. We urge the Commission to seize the opportunity to more effectively utilize this fallow spectrum through a new technology.
- Time required to coordinate with FAA / RTCA process allows for seeking further comments from cellular operators

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Interference Studies for Stratospheric Platforms

- Interference between terrestrial and High Altitude Platform Systems has been studied by the ITU for the last 8 years
  - ITU-R working party 8F (3G) has draft recommendation on sharing between High Altitude Platform Systems (HAPS) and cellular / IMT-2000 systems in the same band.
- FCC has upheld similar studies under the AirCell case (Proceeding 02-86)
- ATG operation on ground not needed since cellular band operation available
- Operation below 10,000 feet not needed

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Summary

- To provide true competition the consumer must have a choice of wireless providers in the cabin
- Other proposals provide no customer choice
- New technologies exist to provide structure that can give competition in the cabin
- Coordination with FAA and RTCA needed
- Potential to combine with fallow cellular spectrum to provide more bandwidth and service uncovered rural areas & accommodate both major wireless technology families
- The AirCell approach provides an alternative that could be serviced from Stratospheric Platforms. However cannot provide competition in both GSM & CDMA technologies.
- Interference between airborne base stations and terrestrial system has been well studied by ITU and in AirCell case. These studies could be adapted to ATG analysis if needed.

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